MONTANA FISH, WILDLIFE & PARKS
FISHERIES DIVISION

Environmental assessment for the rehabilitation of Kilbrennan Lake and Kilbrennan and Feeder Creeks for the purpose of removing eastern brook trout, nonnative rainbow trout, yellow perch, and black bullheads, and restocking with native redband trout.

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: Restore the native fish community and improve angling quality of Kilbrennan Lake through removal of yellow perch (*Perca flavescens*), black bullheads (*Ameiurus melas*), and eastern brook trout (*Salvelinus fontanalis*) by applying the piscicide rotenone and restocking the lake with native redband (rainbow) trout (*Oncorhynchus mykiss)*. This project will also improve spawning habitat in Feeder Creek, the only substantial tributary to the lake, prior to treatment of the lake and install a barrier structure on Kilbrennan Creek to prevent nonnative fish species from recolonizing the lake after treatment.

B. Agency Authority for the Proposed Action: Montana Fish, Wildlife & Parks (FWP) "…is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects…" under Statute 87-1-702.

C. Estimated Commencement Date: The spawning habitat enhancement portion of this is expected to be completed by September 2006, and the piscicide treatment of Kilbrennan Lake is expected to commence in October/November 2006. However, FWP anticipates that a single treatment of Kilbrennan Lake and Feeder and Kilbrennan Creeks may not be completely effective at removing the present fish community within this system due to the tenacious nature of black bullheads and spring activity within Kilbrennan Lake. Therefore, it is likely that the lake will require two piscicide applications. If needed, the second piscicide application would occur in October/November 2007.

D. Name and Location of the Project: Rehabilitation of Kilbrennan Lake and Kilbrennan and Feeder Creeks for the purpose of removing eastern brook trout, nonnative rainbow trout, yellow perch, and black bullheads and restocking with redband trout. This project will be conducted on Kilbrennan Lake, the associated tributary to Kilbrennan Lake (Feeder Creek), and Kilbrennan Creek, the outlet stream to the lake, located approximately 10 miles northwest of the city of Troy, Montana (Figures 1 and 2). Specifically, Kilbrennan Lake is located within Township 33 North, Range 33 West, Section 29, Lincoln County, Montana, Latitude 48 degrees, 35.29 minutes North, Longitude 115 degrees, 53.23 minutes West (Figures 1 and 2).

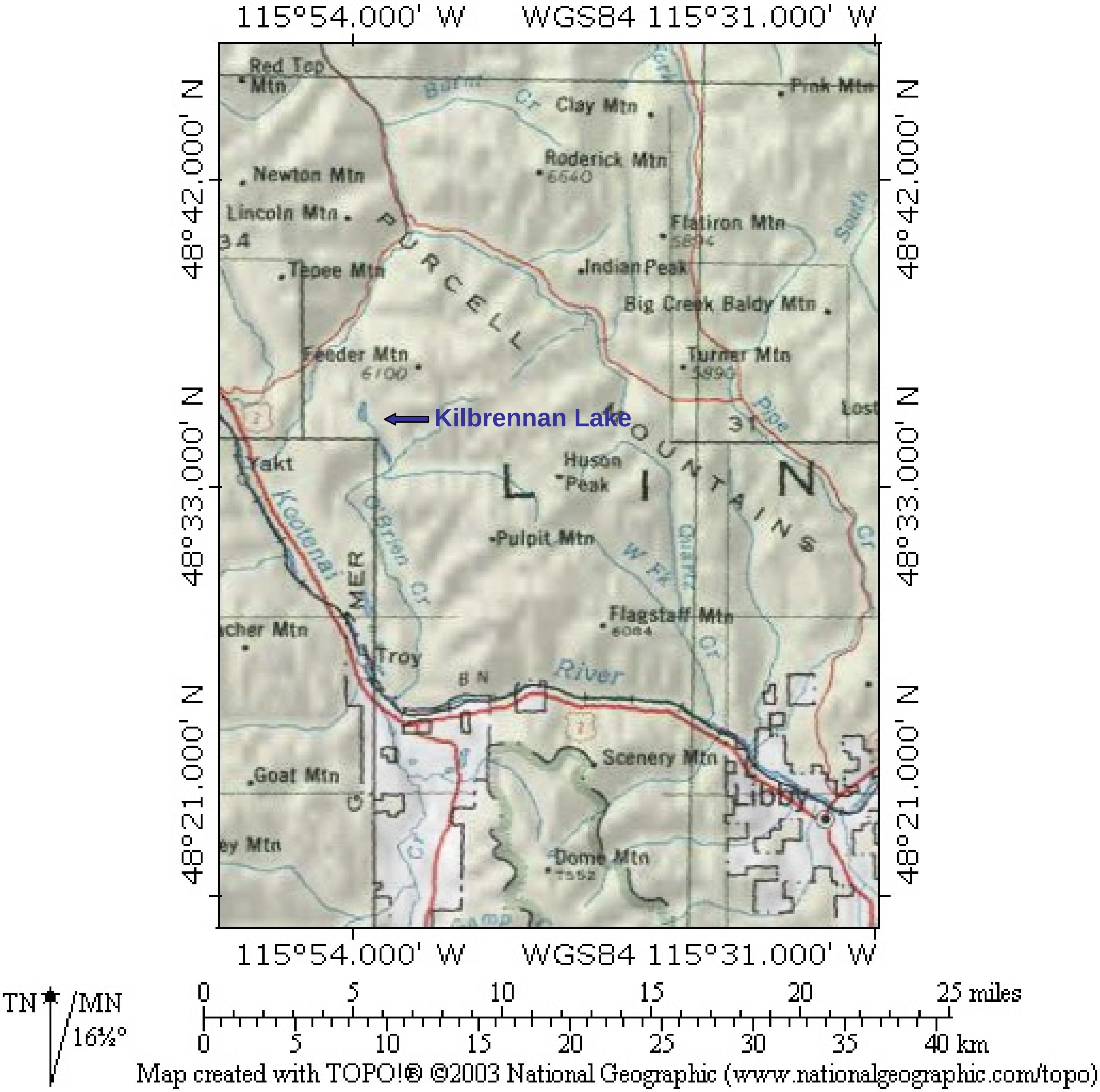

Figure 1. Location of Kilbrennan Lake, located approximately 10 miles northwest of Troy, Montana.

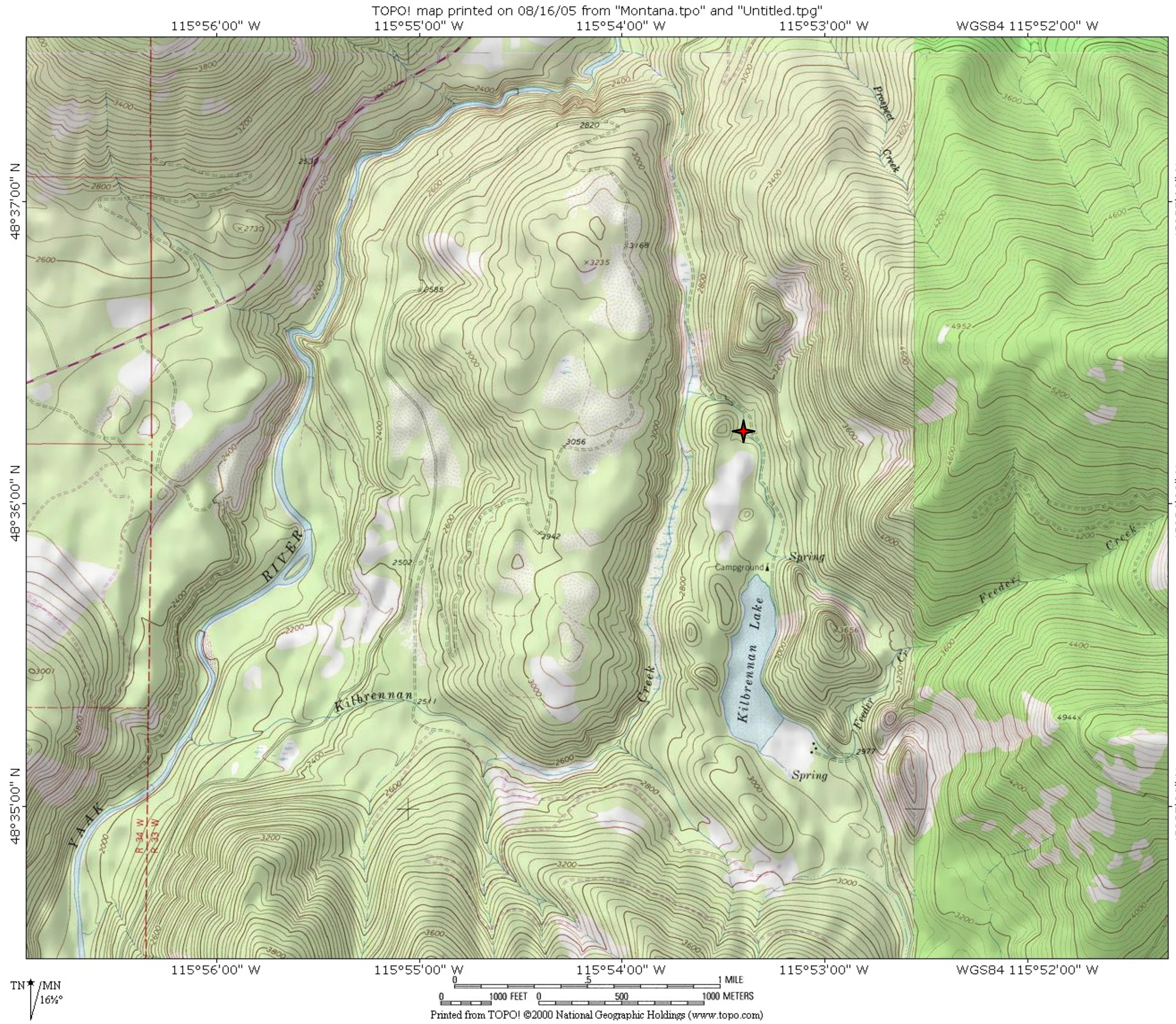

Figure 2. Kilbrennan Lake and Kilbrennan Creek, project area, with the approximate location of the proposed fish barrier installation site identified on the red star.

E. Project Size (acres affected):

1. Developed/Residential – 0 acres
2. Industrial – 0 acres
3. Open space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian – Kilbrennan Lake is 57 acres in size, and has a maximum depth of 22 feet. Kilbrennan Creek flows out of the lake, and the discharge of the creek was measured in July 2005 at 2.2 cubic feet per second (cfs). The only substantial tributaries to Kilbrennan Lake are Feeder Creek and an unnamed spring, both of which enter the lake in the southeast corner of the lake (Figure 2). The discharge of Feeder Creek was measured in July 2005 at 0.7 cfs, and discharge from the unnamed spring was too little to measure.
5. Floodplain – 0 acres
6. Irrigated Cropland – 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres

F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action:

Background

Kilbrennan Lake is located approximately 10 miles north of Troy, Montana, at an elevation of 2,884 feet (Figures 1 and 2). The lake has a surface area of 57 acres and a maximum depth of 22 feet. Feeder Creek and a small, unnamed spring at the south end of the lake are the only major sources of surface water entering the lake. Kilbrennan Creek flows out of the lake through private and public land for about 4 miles to the Yaak River. FWP believes that redband trout were likely the dominant salmonid species historically present in Kilbrennan Lake. However, black bullheads were illegally planted in Kilbrennan Lake sometime in the late 1960s or early 1970s, and since that time black bullheads have become a dominant species in the lake. Yellow perch were illegally introduced into Kilbrennan Lake in approximately 1995. The presence of these two exotic species has dramatically changed the species composition and population dynamics within the lake. Brook trout and rainbow trout numbers have decreased to point of near eradication, while stunted populations of black bullhead and yellow perch are very abundant. As a result of the change in species composition within Kilbrennan Lake, angler use of the lake has also declined within recent years. In 1991, FWP estimated that Kilbrennan Lake received 1,391 angler-days per year, but in 2003, angling pressure on Kilbrennan Lake dropped to 240 angler-days per year.

Phase One – Spawning Habitat Enhancement and Barrier Construction

FWP is proposing a two-phased approach to rehabilitate Kilbrennan Lake. The first phase of this project would occur during the summer of 2006 and would include enhancing the spawning habitat in Feeder Creek and constructing a fish barrier on Kilbrennan Creek. The enhancement of spawning habitat would involve adding up to approximately 40 cubic yards of washed gravel approximately 1.5 inches in diameter to the lower 700 feet of Feeder Creek. This action is intended to benefit redband trout residing in Kilbrennan Lake after project completion. Feeder

Creek has a relatively stable flow pattern throughout the year and has a relatively balanced sediment budget. Therefore, Feeder Creek should be capable of maintaining the gravel placed in the lower stream channel as suitable spawning habitat for redband trout rearing in Kilbrennan Lake. Access for gravel delivery to Feeder Creek will be from the existing road system on the south side of Feeder Creek. The gravel will be delivered to the creek by a small backhoe and either spread by hand or by the backhoe where access permits. The gravel will be placed strategically in the tailout regions of pools and run-type habitat, where redband trout spawning is likely to occur.

FWP maintains that a physical barrier on Kilbrennan Creek is needed in conjunction with this project in order to prevent nonnative fish species from colonizing the lake after the chemical treatment. FWP proposes to construct a physical structure on Kilbrennan Creek to achieve this objective. Kilbrennan Creek leaves Kilbrennan Lake and flows toward the Yaak River and, approximately 0.3 miles downstream from the lake outlet, Kilbrennan Creek enters into a confined valley and the gradient increases. This section of Kilbrennan Creek is adjacent to Forest Service Road 2394. We identified a site on Kilbrennan Creek we believe would best meet project objectives while minimizing risk to the existing forest road. The identified site is approximately 0.8 miles downstream of the lake outlet and is located at latitude N 48 degrees, 36.366 minutes and longitude W 115 degrees, 53.552 minutes. This location has been identified as the most workable location to install the fish barrier based on access, stream channel type (confined and narrow), and stream channel stability. The barrier would be constructed of re-enforced concrete, would span the active channel, and would create a barrier to upstream fish movement by creating a 3-4-jump barrier. The fish barrier installation would be scheduled to occur at base flow period in Kilbrennan Creek, likely during late August/September 2006. This portion of the project would require a USFS special use permit, 124 from FWP, a MT DEQ 318 permit, and a 404 permit from the US ACOE.

Phase 2 - Nonnative Fish Removal

The second phase of this project would include using a combination of piscicides to remove non-native fish species from Kilbrennan Lake, Feeder Creek, and a portion of Kilbrennan Creek. We propose to use Prenfish, a commercial formulation that contains 5% rotenone as the active ingredient, as the primary piscicide for this project to remove nonnative rainbow trout, eastern brook trout, yellow perch, and black bullheads from Kilbrennan Lake and Feeder and Kilbrennan Creeks downstream to the constructed barrier on Kilbrennan Creek. FWP measured the discharge of Kilbrennan and Feeder Creeks in July 2005 at 2.2 and 0.7 cubic feet per second (cfs), respectively. Since the surface outflow substantially exceeds surface inflow into the lake, it is very likely that substantial areas of lake-bottom upwelling exist in Kilbrennan Lake. These upwelling areas may provide refuge areas for fish during the treatment. Therefore, FWP will also use a dry rotenone gel formulation in conjunction with Prenfish at strategic upwelling locations within Kilbrennan Lake. Discharge measurements near the time of treatment will be performed to more accurately estimate the rates of upwelling in the lake. The dry rotenone formulation does not contain petroleum carriers like the liquid formulations, so will not be detectible by fish. Dry rotenone is mixed with gelatin and sand into a dough-like consistency, then formed into ‘doughballs’ or placed in containers, such as burlap bags or plastic buckets with holes in them, and placed in the area of the lake that upwelling is suspected to occur. This dry rotenone formulation would likely be placed directly in upwelling areas immediately prior to the body of the lake being treated with Prenfish. FWP maintains that a physical barrier on Kilbrennan Creek is needed in conjunction with this project in order to prevent nonnative fish species from colonizing the lake after the chemical treatment. Therefore, we propose installing a fish barrier structure on Kilbrennan Creek to achieve this objective, approximately 0.8 miles downstream of the lake outlet. This location has been identified as the most workable location to install the fish barrier based on access, stream channel type (confined and narrow), and stream channel stability.

FWP has a long history of using piscicides to manage fish populations in northwestern Montana. From 1948 through 2002, the department has administered 127 rotenone projects for a variety of reasons, but principally to improve angling quality and less so for native fish conservation.

Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family including jewel vine (*Derris* spp.) and lacepod (*Lonchocarpus* spp.) that are found in Australia, Oceania, southern Asia, and South America. Native people have used rotenone for centuries to capture fish for food in areas where these plants are naturally found. It has been used in fisheries management in North America since the 1930s. Rotenone has also been used as a natural insecticide for gardening and to control ectoparasites such as lice on domestic livestock.

Rotenone acts by inhibiting oxygen transfer at the cellular level and is especially effective at low concentrations with fish because it is readily absorbed into the bloodstream through the thin cell layer of the gills. Mammals and other nongill-breathing organisms do not have this rapid route into the bloodstream and thus can tolerate exposure to concentrations much higher than that used to kill fish. In essence, most nontarget organisms are not impacted at fish-killing concentrations.

The boundaries for the proposed treatment area include the following water bodies: the portion of Feeder Creek from confluence with Kilbrennan Lake upstream to the crossing on Forest Service Road 2394, Kilbrennan Lake, and that portion of Kilbrennan Creek where it leaves the lake to approximately 0.8 miles downstream to the proposed fish barrier that will be installed in conjunction with this project. FWP determined through electrofishing surveys in the spring of 2006 that no fish are present in Feeder Creek upstream of this road culvert. Kilbrennan Lake would be treated with Prenfish brand 5% rotenone. We would follow the Prenfish label recommendations for concentrations for normal lake use when treating the lake. On-site bioassays using caged fish would determine the appropriate concentrations of Prenfish needed for this project; concentrations will not exceed those on the manufacturer's product labels. The Prenfish label states that the persistence would be one week to a month depending on water temperatures, sunlight intensity, alkalinity, etc.

The Prenfish would be dispensed in the lake by boat. Drip stations would be used to dispense the Prenfish in the inlet channels, and the marshy areas around the lakes would be treated with backpack sprayers and pumps. The Prenfish would be dispensed into Feeder and Kilbrennan Creeks via drip station and backpack sprayers.

We will use potassium permanganate to detoxify Kilbrennan Creek near the constructed barrier on Kilbrennan Creek. We will determine the organic demand at several locations within

Kilbrennan Creek and adjust the potassium permanganate concentrations to allow for demand and rotenone detoxification. The discharge of Kilbrennan Creek near the constructed barrier would be measured prior to treatment and the potassium permanganate would be applied at the rate specified on the Prenfish label.

The duration of the stream treatment will be approximately 8 hours; however, treated water will be flowing from the lake for a period of time. We will detoxify the water from the lake until caged fish survive and show no signs of stress in the outlet stream for 4 hours as specified by the label. We expect detoxification with potassium permanganate to occur for 3 to 10 days after treatment. Detoxification with potassium permanganate would occur as long as necessary during and after treatment.

Sentinel cages with target fish would be placed in the lake and stream channels to determine if the toxicity levels are effective and when the piscicide level in the lake is no longer toxic to fish. All dead fish would either be left on-site in the water or transported to a landfill facility for burial.

This project will likely require two applications to achieve complete removal of the present fish community in Kilbrennan Lake due to the tenacious nature of black bullheads and the presence of spring activity within the lake. After the first piscicide application to Kilbrennan Lake and Feeder and Kilbrennan Creeks, we will evaluate the effectiveness of the treatment via gillnetting and electrofishing surveys and use the information gathered from these surveys to evaluate the need for an additional treatment. If a second treatment is required, we will complete the second treatment in October/November 2007.

PART II. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. LAND RESOURCES **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil, which would reduce productivity or fertility?		X				
c. Destruction, covering, or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition, or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?			X			1d.
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

Comment 1d. This project is proposing to install a concrete fish barrier on Kilbrennan Creek for the sole purpose of preventing upstream fish migration in order to prevent recolonization of Kilbrennan Lake by nonnative fish species inhabiting Kilbrennan Creek downstream of proposed fish barrier site. Installation of the fish barrier may slightly alter the sediment transport capacity of Kilbrennan Creek in the local vicinity of the structure. Stream substrate may deposit on the upstream side of the barrier structure after construction due to the reduction in stream gradient required to produce the sufficient differential head to create the fish barrier. Design specifications will attempt to minimize the potential for impact at the location by incorporating design criteria that will allow the structure to pass sediment. The potential impacts associated with the change in stream deposition are expected to be minimal due to the relatively small length of stream in which the gradient change will occur and the design specification that will minimize the effect.

The proposed site for fish barrier is located approximately 0.8 miles downstream of the lake outlet, and is located at latitude N 48 degrees, 36.366 minutes and longitude W 115 degrees, 53.552 minutes. FWP surveyed the streambed of Kilbrennan Creek at the proposed fish barrier installation site and estimated that the average stream gradient was 8.3%, and would be classified as a Rosgen A2 Channel Type (Rosgen 1986). Access to Kilbrennan Creek at this site will be achieved from Forest Road 2394. The installation site is located 117 feet from Forest Road 2394 and, although installation of the barrier will require an excavator and cement truck to access the creek, minimal clearing of vegetation between the Forest Road and Kilbrennan Creek will be required. We do not anticipate the need to cut down any large trees. The barrier structure would consist of a 3-4-foot-high concrete structure. The walls of the structure would be constructed out of reinforced concrete and would be 6-10 inches thick. The structure would likely consist of three walls. A center wall would be constructed perpendicular to the stream thalweg, and two wing walls would be connected to the center wall at an approximate angle of 45 degrees. Each wing wall would extend approximately 4-8 feet into the stream bank and would be armored both upstream and downstream with large native substrate to prevent erosion.

Construction of the fish barrier would be scheduled to occur at base flow period in Kilbrennan Creek, likely during late August/September. The upstream side of the structure would be back-filled with native substrate materials for approximately 50′ upstream to an average gradient of 2%. In addition to a USFS special use permit, we would also be required to obtain a FWP 124 permit, MT DEQ 318 and 308 permits, and a US ACOE 404 permit for this portion of the project.

2. WATER Will the proposed action result in:	Impact Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen, or turbidity?			X		Yes	2a.
b. Changes in drainage patterns or the rate amount of surface runoff?		X				
c. Alteration of the course or magnitude of floodwater or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water-related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				2f.
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		Yes	2a and 2f.
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?			X		Yes	2j.
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		Yes	2m.

Comment 2a. This project is designed to intentionally introduce Prenfish and powdered rotenone formulation to surface water to kill unwanted fish, as well as potassium permanganate ($KMnO_4$) as a means to deactivate the piscicides. The impacts from the additions of these chemicals to the water would be short term and minor.

Prenfish and powdered rotenone naturally break down. Rotenone is a highly unstable compound and a variety of factors influence natural breakdown, including water chemistry, water temperature, exposure to organic substances, exposure to oxygen, and sunlight intensity (Ware 2002; ODFW 2002; Loeb and Engsrtom-Heg 1970; Engstrom-Heg 1972; Gilderhus et al. 1986). Rotenone persistence studies by Gilderhus et al. (1986) and Dawson et al. (1991) found that in cool water temperatures of 32 to 46°F the half-life ranged from 3.5 to 5.2 days. Gilderhus et al. (1986) reported that 30% mortality was experienced in rainbow trout exposed to degrading concentrations of actual rotenone (0.004 ppm) in 46°F pond water 14 days after a treatment. By day 18 the concentrations were sub-lethal to trout.

All formulations of rotenone can be diluted with freshwater to reduce toxicity to fish and can also be detoxified by applying an oxidizing agent like potassium permanganate. This dry, crystalline substance is mixed with stream or lake water to produce a concentration of liquid sufficient to detoxify rotenone formulations. Detoxification is accomplished after about 20-30 minutes of mixing between the two compounds (Prentiss Inc. 1998). Potassium permanganate ($KMnO4$) quickly detoxifies Prenfish, and it may be used to detoxify water leaving the lake or downstream in Kilbrennan Creek. Potassium permanganate is routinely added to municipal water supplies for the control of compounds causing taste and odors.

To help ensure that aquatic life and water quality in Kilbrennan Lake and Feeder and Kilbrennan Creeks will not be affected, Prenfish and a powdered rotenone formulation used by this project will be detoxified with potassium permanganate near the proposed fish barrier. Potassium permanganate has long been used for various applications in fish culture including use as a control for external parasites (Lay 1971) and for detoxification of rotenone (Lawrence 1956). However, potassium permanganate itself is toxic to fish if concentrations are too high. The toxicity of potassium permanganate to fish is dependent on the particular chemistry of the water in question. Surface waters have a potassium permanganate demand based on the amount of organic materials in the water. Successful use of potassium permanganate to detoxify Prenfish and powdered formulations of rotenone is based on balancing the amount of potassium permanganate with the natural chemical demand of the water and the chemical demand caused by the piscicide.

Dead fish would result from this project. Bradbury (1986) reported that approximately 70% of rotenone fish killed in Washington lakes never surface. Parker (1970) reported that at water temperatures of 40°F and less, dead fish required 20-41 days to surface, and although no trout were involved in his study, he did include bluegill (*Lepomis macrochirus),* green sunfish (*Lepomis cyanellus),* orange spotted sunfish (*Lepomis humilis*), white crappie (*Pomoxis annularis)* (all of which are similar to the yellow perch currently found in Kilbrennan Lake), brown bullhead (*Ictalurus nebulosus),* and black bullhead in the study. The most important factors inhibiting fish from ever surfacing are cool water (<50°F) and deep water (>15 feet). Kilbrennan Lake would likely meet these criteria during an October or November treatment. Bradbury (1986) reported that 9 of 11 water bodies in Washington treated with rotenone experienced an algae bloom shortly after treatment. This is attributed to the input of phosphorus to the water as a result of decaying fish. Bradbury further notes that approximately 70% of the phosphorus content of the fish stock would be released into the lake through bacterial decay. This action stimulates phytoplankton production, then zooplankton production, and starts the lake toward production of food for fish. Therefore, this change in water chemistry is viewed as a benefit to stimulate plankton growth. Any changes or impacts to water quality resulting from decaying fish would be short term and minor.

Comment 2f: The risk that rotenone will enter and be mobile in groundwater is minimal. Rotenone's ability to move through soil is low (Finlayson et al. 2000). Rotenone moves less than 1 inch in most types of soils, except for sandy soils where the movement is slightly more than 3 inches. Rotenone is strongly bound to organic matter in soil, so it is unlikely that rotenone would enter the groundwater (Dawson et al. 1991). Rotenone can be found in lake sediments at similar concentrations as in water; its breakdown lags behind that of water by 1-2 weeks (Finlayson et al. 2000). Rotenone in stream sediments is uncommon (CDFG 1994). However, even if groundwater contamination could occur, there would be a low potential for detrimental effects on human health, since the surface water concentrations to be used in this project are shown to have no toxic effect on humans or other animals (see Sections 5 and 8 below). Furthermore, any rotenone that enters groundwater will continue to be diluted by water already present in the aquifer. The chance for exposure of rotenone to ground water is minimal since no domestic wells are nearby.

Although there are no domestic wells located within the project area, a single household on lower Kilbrennan Creek relies on Kilbrennan Creek for domestic water. FWP will consult with the landowner regarding this issue and provide a workable and safe source of domestic water, which will be made available for use from just prior to the application of Prenfish or powdered rotenone formulation until the degradation process of these piscicides is complete. We will collect water samples from the domestic water source and test for the presence of rotenone and the petroleum-based carriers in Prenfish. We will also follow the Prenfish label recommendations that advise using sentinel fish (rainbow trout in this case) to ensure the product has adequately degraded.

Comment 2j: Bioassays on mammals indicate that at the proposed concentrations Prenfish and the powdered rotenone formulation would have no effect on mammals, including humans that drink the treated water (Schnick 1974). The studies required for setting tolerances for the use of rotenone in waters intended for irrigation, livestock consumption (except possibly for swine), and recreational swimming use have been completed and suggest that at the proposed concentrations of rotenone that will be used, it would have no effect on mammals (including humans) that drink the treated water. Moreover, rotenone was used for many years to control grubs on the backs of dairy and beef cattle. Regardless, the USEPA has not yet established tolerances for rotenone in potable and irrigation water. As a result, although waters with rotenone present may not cause problems, water containing residues of rotenone cannot be legally allowed for use for domestic or crop use. The degradation process can vary from 1-8 weeks depending on initial concentrations, temperature, and water chemistry. Public recreation within the project area during the time period that Prenfish and powdered rotenone will be used is minimal.

Comment 2m: FWP would apply for an exemption of surface water quality standards from Montana DEQ under Section 308 of the Montana Water Quality Act for the application of the piscicides. FWP will also be required to obtain four permits required for the installation of the barrier structure on Kilbrennan Creek. We will obtain a 318 turbidity exemption permit from MT DEQ, a 404 permit from the U.S. Army Corps of Engineers, a 124 permit from FWP, and a special use permit from the U.S. Forest Service.

3. AIR Will the proposed action result in:	Impact Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Emission of air pollutants or deterioration of ambient air quality? (Also see 13c.)			X			3a.
b. Creation of objectionable odors?			X			3b.
c. Alteration of air movement, moisture, or temperature patterns, or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge, which will conflict with federal or state air quality regulations?		X				

Comment 3a: Emissions from outboard motors' exhaust would be created, but are expected to dissipate rapidly. Any impacts from these odors would be short term and minor.

Comment 3b: Liquid-formulated rotenone does contain aromatic solvents that make it soluble in water. The odors that result from these solvents may last for several hours to several days, depending on air and water temperatures and wind direction. These relatively "heavy" organic compounds tend to sink (remain close to the ground) and move downwind. The California Department of Pesticide Regulation (CDPR 1998, cited in Finlayson et al. 2000) found no health effects from this smell. Applicators would have the greatest contact with these odors, but would be protected because they would be wearing personal protective equipment, as the product label recommends and as is mandated by the Montana Department of Agriculture. Any impacts caused by objectionable odors would be short term and minor.

Dead fish would result from this project and may cause objectionable odors from decomposition. However, the number of dead fish that surface as a result of this project may be reduced by completing the application during the fall because water temperatures will be cooler, which has been shown to reduce the number of fish that surface after the application of rotenone. Objectionable odors will also be limited due to ice formation on Kilbrennan Lake that will likely occur within 2-4 weeks after piscicide application. Therefore, we would expect odors to be short term and minor.

4. VEGETATION **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Changes in the diversity, productivity, or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?		X				
b. Alteration of a plant community?		X				
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?		X				
f. Will the project affect wetlands or prime and unique farmland?		X				

5. FISH/WILDLIFE **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		Yes	5b.
c. Changes in the diversity or abundance of nongame species?			X		Yes	5c.
d. Introduction of new species into an area?			X		No	5d.
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?	X					5f.
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest, or other human activity)?		X				
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f.)	X					See 5f.
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d.)			X			See 5d.

Comment 5b: This project is designed to kill unwanted fish. Yellow perch, eastern brook trout, and nonnative rainbow trout are game species that would be eliminated from Kilbrennan Lake and Kilbrennan and Feeder Creeks. Black bullheads would also be eliminated, but are not classified as a game species. The impact from the removal of these fish species is expected to be short term and minor because the lakes would be restocked with redband trout and would also likely pioneer into sections of Feeder and Kilbrennan Creeks.

Comment 5c:

Aquatic Invertebrates: Nongame (nontarget) species that would be impacted include zooplankton, some aquatic insects, and possibly some amphibians. Numerous studies indicate that rotenone has temporary or minimal effects on aquatic insects and plankton. Anderson (1970) reported that comparisons between samples of zooplankton taken before and after a rotenone treatment did not change a great deal. Despite the inherent natural fluctuations in zooplankton communities, the application of rotenone had little effect on the zooplankton community. Cook and Moore (1969) reported that the application of rotenone has little lasting effect on the nontarget insect community of a stream. Kiser et al. (1963) reported that 20 of 22 zooplankton species reestablished themselves to pretreatment levels within about 4 months of a rotenone application. Cushing and Olive (1956) reported that the insects in a lake treated with rotenone exhibited only short-lived effects. Hughey (1975) concluded that three Missouri ponds treated with rotenone showed little short-term and no long-term effect on population levels of zooplankton. The effects of rotenone on plankton were consistent with the natural variability that is characteristic of plankton populations, and re-colonization was rapid and reached near pretreatment levels within eight months.

Both Anderson (1970) and Kiser et al. (1963) reported that most zooplankton species survive a rotenone treatment via their highly resilient egg structures. In addition, parthenogenesis of some female plankton occurs, causing sexual dimorphism, which greatly increases plankton density in times of population distress. FWP expects a similar response from the zooplankton community in Kilbrennan Lake following rotenone treatment.

Case studies conducted on Devine Lake in the Bob Marshall Wilderness from 1994-1996 indicate that invertebrates actually increased in number and very slightly increased in diversity following a rotenone treatment (Rumsey et al. 1996). This is supported by observations made by Cushing and Olive (1956), who reported that oligochaetes (worms) increased in number after a rotenone treatment, but later stabilized. *Gammarus* species (fresh water shrimp), a common fish food item, were detected in Devine Lake only when fish were present. Neighboring Ross Lake, in the Bob Marshall Wilderness, is fishless and was used to measure natural insect and plankton variation during the Devine Lake treatment and evaluation. *Gammarus* species were never detected in Ross Lake, although it is fishless. Invertebrate numbers in Ross Lake were reported to be relatively stable, but the diversity of insects fluctuated considerably over time. Therefore, FWP expects that the impacts to these nontarget organisms would be short term and minor.

Amphibians: U.S. Forest Service personnel observed spotted frogs (*Rana pretiosa*) and Western toads (*Bufo boreas*) in the project area. Other amphibian species, which may be present on the project area, are long-toed salamanders (*Ambystoma macrodactylum*), tailed frogs (*Ascaphus truei*), and Pacific chorus frogs (*Pseudacris regilla*).

Rotenone is toxic to most gill-breathing larval amphibians, but is not harmful to adults (Schnick 1974). Chandler and Marking (1982) found that southern leopard frog tadpoles were between 3 and 10 times more tolerant than fish to Noxfish (5% rotenone formulation). Grisak et al. (in prep) conducted laboratory studies on long-toed salamanders, tailed frogs, and Columbia spotted frogs and concluded that the adult life stages of these species would not suffer an acute response to rotenone, but the larval and tadpole stages could be affected by rotenone at fish-killing concentrations. These authors recommended implementing rotenone treatments at times when the larvae and tadpoles are not present, such as the fall (which is the case in this project), to reduce potential for impacts.

Reptiles: Western terrestrial garter snakes (*Thamnophis elegans*), common garter snakes (*Thamnophis sirtalis*), and racer snakes (*Coluber constrictor*) likely inhabit the project area and are within the known distribution range of painted turtles (*Chrysemys picta*), rubber boa snakes (*Charina bottae*), western skinks (*Eumeces skiltonianus*), and northern alligator lizards (*Elgaria coerulea*). However, FWP has not observed any of these species in the vicinity of the project area. Reptiles are apparently not affected by rotenone treatments (Schnick 1974). The effect of this project on the reptile community is expected to be nonexistent to minor.

Mammals and Birds: The effect of rotenone on birds and mammals has been studied extensively. Mammals in general are not affected because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Laboratory tests fed forms of rotenone to rats and dogs as part of their diet for periods of six months to two years (Marking 1988). Researchers observed effects such as diarrhea, decreased food consumption, and weight loss, and reported that despite unusually high treatment concentrations of rotenone in rats and dogs, it did not cause tumors or reproductive problems in mammals. CDFG (1994) studies of risk for terrestrial animals found that a 22-pound dog would have to drink 7,915 gallons of lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish, to receive a lethal dose. The state of Washington reported that a half pound mammal would need to consume 12.5 mg of pure rotenone to receive a lethal dose (Bradbury 1986). Considering the only conceivable way an animal can consume the compound under field conditions is by drinking lake or stream water, a half pound animal would need to drink 33 gallons of water treated at 2 ppm rotenone. Brooks (1961) reported that this amount is more on the order of 49 gallons. Similar results determined that birds required levels of rotenone at least 1,000 to 10,000 times greater than is required for lethality in fish (Skaar 2001). Cutkomp (1943) reported that chickens, pheasants, and members of lower orders of *Galliformes* were quite resistant to rotenone, and four day old chicks were more resistant than adults. Ware (2002) reports that swine are uniquely sensitive to rotenone, and it is slightly toxic to wildfowl, but to kill Japanese quail required 4,500 to 7,000 times more than is used to kill fish. One study, in which rats were injected with rotenone for a period of weeks, reported finding lesions characteristic of Parkinson's disease (Betarbet et al. 2000). However, the results have been challenged on the basis of methodology: (1) that the continuous intravenous injection method used leads to "continuously high levels of the compound in the blood," and (2) that dimethyl sulfoxide (DMSO) was used to enhance tissue penetration (normal routes of exposure actually slow introduction of chemicals into the bloodstream). Finally, injecting rotenone into the body is not a normal way of assimilating the compound. Similar studies (Marking 1988) have found no Parkinson-like results. Extensive research has demonstrated that rotenone does not cause birth defects (HRI 1982), gene mutations (Van Geothem et al. 1981; BRL 1982), or cancer (Marking 1988). Spencer and Sing (1982) reported that rats that were fed diets laced with 10-1,000 ppm rotenone over a 10-day period did not suffer any reproductive dysfunction. Rotenone was found to have no direct role in fetal development of rats that were fed excruciatingly high concentrations of rotenone. Typical concentrations of actual rotenone used in fishery management range from 0.025 to 0.50 ppm and are far below that administered during most toxicology studies.

It is important to note that nearly all of these examples presented here involved subjecting laboratory specimens to unusually high concentrations of rotenone or conducting tests on animals that would not be exposed to rotenone during normal use in fisheries management.

Based on this information we would expect the impacts to nontarget mammals and birds to range from nonexistent to short term and minor.

Comment 5d: This project is designed to introduce redband trout into Kilbrennan Lake following the removal of the other species specifically for the purposes of improving angling quality and native species conservation. FWP believes that redband trout were likely the dominant salmonid species historically present in Kilbrennan Lake. A barrier structure on Kilbrennan Creek will be installed downstream of the lake outlet specifically to prevent nonnative rainbow and brook trout from recolonizing the lake after treatment.

Comment 5f: Bald eagles (*Haliaeetus leucocephalus)*, grizzly bears (*Ursus arctos horribilis)*, Canada lynx (*Lynx Canadensis)*, and grey wolves (*Canis lupus)* may also be present within the general vicinity of the project area, but no known nesting or birthing sites are known to occur in the immediate area. The effect of this project on these species is expected to be short term and minor or nonexistent, which would be similar to the effect on other birds and mammals within the area. FWP based this assessment on the unrealistic volume of treated water and/or fish killed by rotenone that would need to be consumed by any of these species to produce a harmful effect (see Comment 5c above). This project is not likely to have secondary effects, such as displacement, on any of these species. Project personnel activity during project completion may be slightly higher than existing recreational use during the remainder of the summer and fall, but should have no effect on sensitive animal displacement. The fish community in Kilbrennan Lake is unlikely to be a substantial food source for any of these sensitive animal species. Therefore removing these fish from Kilbrennan Lake will have little or no impact on any of these species. Bull trout (*Salvelinus confluentus)* are not known to exist in Kilbrennan Lake or Kilbrennan or Feeder Creeks.

B. HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS Will the proposed action result in:	Impact Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Increases in existing noise levels?		X				
b. Exposure of people to severe or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

7. LAND USE Will the proposed action result in:	Impact Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflict with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?		X				
d. Adverse effects on or relocation of residences?		X				

8. RISK/HEALTH HAZARDS Will the proposed action result in:	Impact Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		Yes	8a.
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?			X		Yes	8b.
c. Creation of any human health hazard or potential hazard?			X		Yes	8a and 8c.
d. Will any chemical toxicants be used?			X		Yes	8a.

Comment 8a: There is a minor risk of spilling rotenone or potassium permanganate directly into the lake or stream. Rotenone and potassium permanganate are normally diluted in water prior to introduction into a body of water. If undiluted rotenone or potassium permanganate is spilled, or if a drip station tips into the stream, a higher concentration of chemical in the stream will result. This will likely cause a higher mortality of fish and aquatic macroinvertebrates in the area downstream from the spill. Should the concentration of rotenone exceed the ability of the detoxification stations abilities, some eastern brook trout or rainbow trout in lower Kilbrennan Creek or the Yaak River downstream of the constructed barrier may be killed. There is little chance any rotenone will reach the Yaak River, but if it does, it is not likely to impact fish due to dilution. FWP queried daily flow records for the Yaak River collected at a USGS gauging station located near the confluence with the Kootenai River and found that mean daily discharge during October and November in the Yaak River averaged 195.4 and 314.9 cfs, respectively. Therefore, the expected discharge in the Yaak River during the implementation period of this project is 50-150 times greater than the discharge of Kilbrennan Creek, and should therefore provide sufficient dilution to prevent harm to fish in the Yaak River, should an accidental spill occur.

There is a minor risk of a health hazard for project personnel associated with eye or skin contact with Prenfish, the commercial formulation of rotenone. Contact of Prenfish with the eyes can cause intense pain and irritation immediately or within several hours following contact. The human health risks are similar for powdered rotenone. Both of these piscicide products have spill contingency requirements on the Manufacturer Safety Data Sheets (MSDS) that will be strictly adhered to. State and federal laws require that both of these products be applied by certified applicators trained to respond to spills and human exposure to these chemicals. Project personnel will be trained in safety procedures and all personnel involved in the application of these chemicals will utilize personal protective equipment to ensure safety. Personnel will use all safety equipment specified on the product labels. This project will also develop an implementation and safety plan to ensure safe application of these chemicals. The risk of exposure of these chemicals to the public will also be minor. Public signs notifying the public of the project will be posted in the area at all access routes, and the two forest access roads will be temporarily closed on the day the piscicides are applied.

Substantial research has been conducted to determine the human health threats of rotenone. From this research it has been concluded that rotenone does not cause birth defects (Hazleton Raltech Laboratories 1982), reproductive dysfunction (Spencer and Sing 1982), gene mutation (Biotech Research 1981; Van Geothem et al. 1981; NAS 1983) or cancer (USEPA 1981b; Tisdel 1985). When used according to label instructions for the control of fish, rotenone poses little, if any, hazard to public health. The USEPA (1981, 1989) has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment. The hazard associated with the short-term exposure to drinking water containing rotenone is very small because of the low concentration of rotenone (0.5 ppm) used in the treatment and the rapid breakdown and dilution of rotenone. Estimates of a single lethal dose to humans are 300-500 mg of rotenone per kilogram (2.2 pounds) of body weight (Gleason et al. 1969). For example, a 160-pound (72.6 kilogram) person would have to drink over 23,000 gallons (87,000 liters) of water treated at 0.25 mg of rotenone per liter of water at one sitting; 0.25 mg of rotenone per liter of water is the highest allowable treatment rate for fish management. A 22-pound (10 kilogram) child would have to drink over 1,429 gallons (5,400 liters). An intake of 0.7 mg of rotenone per kilogram of body weight per day is considered safe (Haley 1978), which is equivalent to about 25 mg per liter when consumed as drinking water; this concentration is far greater than the expected exposure resulting from the maximum fish management treatment rate of 0.25 mg of rotenone per liter of water or our proposed concentration of 0.1 mg per liter. DEQ indicates the safe concentration for short-term human consumption is about 350 mg/l (350 ppm), well over 100 times the application concentration.

Although there are no domestic wells located within the project area, a single household on lower Kilbrennan Creek relies on Kilbrennan Creek for domestic water. FWP will consult with the landowner regarding this issue and provide a workable and safe source of domestic water, which will be made available for use from just prior to the application of rotenone until the degradation process is complete. FWP will monitor the domestic water source for the presence of rotenone after the project is completed to ensure the water is safe for domestic consumption.

Risks to applicators are substantially greater than risks to the general public because of the necessity of handling the compounds at full strength. Measures to reduce risks to applicators include training, proper handling, and the use of safety equipment listed on the product labels such as respirator, goggles, rubber boots, Tyvek overalls, and nitrile gloves. All applicators would be trained on the safe handling and application of the piscicide. At least one, and most likely several, Montana Department of Agriculture certified pesticide applicator(s) would supervise and administer the project. Rotenone and potassium permanganate would be transported, handled, applied, and stored according to the label specifications to reduce the probability of human exposure or spill. Health risk to project personnel will be minimized through the use of proper planning, preparation, and the use of personal protective gear.

FWP will limit human exposure of the chemicals used for this project to the public by providing domestic water for the local landowner on lower Kilbrennan Creek, closing the site to public use, collecting dead fish from the site, containing the treatment within the designated zone by detoxifying the piscicides, and posting signs within the project area that indicate no drinking, no swimming, and no eating dead fish.

Fish will not be stocked into Kilbrennan Lake until the toxic effects are gone, as indicated on the product labels. FWP will use caged fish (rainbow trout) to determine toxicity. Stocked fish will not accumulate residues of rotenone from the water. Any fish that might survive the treatment won't pose a health threat because the bioaccumulation potential is low and the half-life of rotenone in fish is approximately 1 day (Gingerich and Rach 1985; Gingerich 1986).

Prenfish, the commercial formulation of rotenone used for this project, contains volatile organic compounds (xylene, trichlorethylene (TCE), toluene, and trimethylbenzene) and semi-volatile organic compounds (naphthalene, 1-methyl naphthalene, and 2-methyl naphthalene). The organic compounds disappear before rotenone dissipates, typically within 1-3 weeks (Finlayson et al. 2000). The volatile organic compounds don't accumulate in the sediment; naphthalene and methyl naphthalene accumulate temporarily in the sediments (CDFG 1994; Siepmann and Finlayson 1999). TCE (a carcinogen) concentrations are expected to be within drinking water standard levels immediately following treatment. As a result of treatment, other materials will not exceed water quality criteria or guidelines set by the USEPA (1980, 1981, 1993). Many of constituents in liquid rotenone formulations are the same present in fuel and are present in waters because of outboard motor use. None of these constituents will be present at levels that can be expected to adversely affect wildlife or human health (*from* Liknes 2000).

Comment 8b: FWP has a treatment plan for piscicide projects. This plan addresses many aspects of safety for people who are on the implementation team such as establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, spill contingency plan, first aid, emergency responder information, personal protective equipment, and monitoring and quality control. Implementing this project should not have any impact on existing emergency plans. The fact that an implementation plan has been developed by FWP and this project will use properly trained personnel reduces the risk of need for an emergency response. Any effects to existing emergency responders would be short term and minor.

Comment 8c: Although pesticides are used widely to control unwanted species, legitimate public concerns have been raised regarding the safety and health effects to humans. As with any pesticide, direct exposure to, or consumption of, piscicides at full strength can have harmful or sometimes fatal effects on humans (BPA 2004). Rotenone is an EPA-registered pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). There are no federal or Montana numeric water quality standards for rotenone; however, MDEQ (2001) used the EPA method of calculating human health criteria based on noncarcinogenic effects to estimate a safe level for lifelong exposure to water and the consumption of fish exposed to water containing rotenone: 40µg/L water plus fish.

Prenfish, the rotenone formulation that would be used for this project, contains five percent active ingredient. When the formulation is applied to achieve 1 mg/L in the water body, the active ingredient concentration is 0.05 mg/L or 50 µg/L. The target concentration would be 10µg/L above the calculated long-term safe level. But the long-term safe level was determined using the standard assumption that fish would be exposed to rotenone and be able to bio-concentrate rotenone. This assumption is extremely protective. Rotenone is a natural chemical, but is not naturally found in Montana and is not a chemical likely to be found in fish that are commercially available for consumption. Fish exposed to rotenone at the target concentration would die within two to three hours; thus bio-concentration is very unlikely. Most of the dead fish in the treated lakes would sink to the bottom of the lake. Fish that wash up during the crew's presence at the lake would be collected for disposal. The potential long-term risk to humans with water as their only source of rotenone exposure yields 140µg/L as a safe, long-term concentration.

Since tissue and water concentrations of rotenone decline quickly after treatment, and people would not likely be exposed to treatments on a continual basis, hazardous life-long exposure to rotenone is extremely unlikely. Public health issues surrounding the use of rotenone have been studied extensively. In general, the EPA through FIFRA certification process has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment (Finlayson, et al. 2000) as long as the label instructions are followed.

In their description of how South American Indians prepare and apply *Timbó*, a rotenone parent plant, Teixeira et al. (1984) reported that the Indians extensively handled the plants during a mastication process, and then swam in lagoons with the plant pulp on their backs for distribution. No harmful effects were reported.

Finlayson, et al. (2000) reported that the EPA “has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment.” In relation to air quality, they further note that “no public health effects from rotenone use as a piscicide have been reported.” The reentry statement on the Prenfish label states that swimmers must not enter until the piscicide is thoroughly mixed.

Aside from the rotenone itself, liquid formulations also consist of petroleum emulsifiers. Finlayson (2000) wrote regarding the health risks of these constituent elements:

> “ . . . the EPA has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment. The California Environmental Protection Agency found that adverse impacts from properly conducted, legal uses of liquid rotenone formulations in prescribed fish management projects were nonexistent or within acceptable levels (memorandum from J. Wells, California Department of Pesticide Regulation, to Finlayson, 3 August 1993). Liquid rotenone contains the carcinogen trichloroethylene (TCE). However, the TCE concentration in water immediately following treatment (less than 0.005 mg TCE per liter of water [5 ppb]) is within the level permissible in drinking water (0.005 mg TCE per liter of water, EPA 1980). None of the other materials including xylenes, naphthalene, piperonyl butoxide, and methylnaphthalenes exceed any water quality criteria guidelines (based on lifetime exposure) set by the EPA (1980, 1981, 1993). Many of these materials in the liquid rotenone formulations (trichloroethylene, naphthalene, and xylene) are the same as those found in fuel oil and are present in waters everywhere because of the frequent use of outboard motors . . .”

California Department of Fish and Game (CDFG, 1994) calculated that the maximum expected level of these contaminants following a treatment level of 2 ppm formulation are TCE 1.1 ppb; toluene 84 ppb; xylenes 3.4 ppb; naphthalene 140 ppb. The product label states:

> “ . . . do not use dead fish for food or feed, do not use water treated with rotenone to irrigate crops or release within ½ mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond, or reservoir. . . do not allow swimming in rotenone-treated water until the application has been completed and all pesticide has been thoroughly mixed into the water according to the labeling instructions. This product is flammable and should be kept away from heat and open flame . . .”

The major risks to human health from rotenone come from accidental exposure during application. This is the only time when humans are exposed to concentrations that are greater than that needed to remove fish. To prevent accidental exposure to liquid-formulated rotenone, the Montana Department of Agriculture requires applicators to:

- Be trained and certified to apply the pesticide in use.
- Be equipped with the proper safety gear, which, in this case, includes fitted respirator, eye protection, rubberized gloves, hazardous material suit.
- Have product labels with them during use.
- Contain materials only in approved containers that are properly labeled.
- Adhere to the product label requirements for storage, handling, and application.

Any threats to human health during application could be greatly reduced with proper application and use of safety equipment. Recreationists in the area would likely not be exposed to the treatments because temporary trail closures would preclude many from being in the area. Proper warning through news releases, signing around the lake, and administrative personnel in the project area should be adequate to keep unintended recreationists from being exposed to any treated waters. Administering application in the fall of the year would further reduce exposure due to the relatively low number of users in this area during this time.

9. COMMUNITY IMPACT **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

10. <u>PUBLIC SERVICES/TAXES/UTILITIES</u> **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify:		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources?		X				
f. Define projected maintenance costs?		X				

11. <u>AESTHETICS/RECREATION</u> **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)			X			See 11c.
d. Will any designated or proposed wild or scenic rivers, trails, or wilderness areas be impacted? (Also see 11a, 11c)		X				

Comment 11c: This project is specifically intended to improve angling quality in Kilbrennan Lake, which may result in an increase of recreational activities over present levels. In 2003, FWP estimated that Kilbrennan Lake received 240 angler-days per year, compared to 1,391 angler-days in 2003. The decrease in angler use was presumably due to decrease in angling quality that resulted after the illegal introductions of nonnative fish species. The benefits of increased recreational use would outweigh any potential impacts associated with the treatment. Any impacts to aesthetics would be short term and minor and be directly associated with the actual rotenone treatment and immediate aftermath, including dead fish in the project area. No tourism report is necessary to quantify these impacts.

12. <u>CULTURAL/HISTORICAL RESOURCES</u> **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Destruction or alteration of any site, structure or object of prehistoric, historic, or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				
d. Will the project affect historic or cultural resources?		X				

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources that create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects that are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard, or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	Impact Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
e. Generate substantial debate or controversy about the nature of the impacts that would be created?	X				Yes	13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)	X					13f
g. List any federal or state permits required.						13g

Comments 13e and f: The use of pesticides can generate controversy from some people. Public outreach and information programs can educate the public on the use of pesticides. FWP has a long history of using rotenone for fisheries management in northwest Montana, which includes application to nearly 130 streams and lakes from 1948 through present. It is not known if this project would have organized opposition. One reason that FWP is considering this course of action is based on public reports that angling quality in Kilbrennan Lake is low. This project would serve to reverse that condition.

Comment 13g: The following permits would be required:

1. MT DEQ 308 - Department of Environmental Quality (authorization for short-term exemption of surface water quality standards for the purpose of applying a fish toxicant).

2. U.S. Forest Service – A special use permit issued by the U.S. Forest Service Three Rivers Ranger District will be required if FWP elects to construct a barrier to prevent upstream fish migration.

3. MT DEQ 318 – Department of Environmental Quality (authorization for short-term turbidity exemption permit for the installation of the barrier structure on Kilbrennan Creek.

4. US ACOE Section 404 – U.S. Army Corps of Engineers authorization for the installation of the barrier structure on Kilbrennan Creek.

PART III. ALTERNATIVES

Alternative 1 – No Action

The no-action alternative would allow status quo management to continue, which would maintain the low quality angling in Kilbrennan Lake. Redband trout would not be present in Kilbrennan Lake or Kilbrennan and Feeder Creeks. The dominant fish species present in Kilbrennan Lake would continue to be yellow perch and black bullheads for many years. Implementation of this alternative would do little to conserve native fish species in the Yaak River drainage.

Alternative 2 – Rotenone and antimycin treatment and restocking with redband trout (Proposed Action)

The proposed action involves removing yellow perch and black bullheads, eastern brook trout, and nonnative rainbow trout from Kilbrennan Lake, Feeder Creek, and a segment of Kilbrennan Creek downstream to the constructed barrier on Kilbrennan Creek using the piscicide rotenone in the commercial formulation Prenfish and dry powdered form. Afterwards the lake would be stocked with redband trout. The proposed alternative also involves improving trout spawning habitat in Feeder Creek, the only tributary to Kilbrennan Lake, and installing a fish barrier on Kilbrennan Creek. This alternative would restore a native fish species to part of its historic range and improve angling opportunities in Kilbrennan Lake and Kilbrennan Creek.

Alternative 3 – Rotenone and antimycin treatment and restocking with redband trout and eastern brook trout

This alternative involves removing yellow perch and black bullheads, eastern brook trout, and nonnative rainbow trout from Kilbrennan Lake, Feeder Creek, and a segment of Kilbrennan Creek downstream to an existing or newly constructed fish barrier using the fish toxicants rotenone and antimycin. This alternative also involves improving trout spawning habitat in Feeder Creek, the only tributary to Kilbrennan Lake, and installing a fish barrier on Kilbrennan Creek. This alternative differs from Alternative 2 (preferred alternative) only in regard to the fish species to be restocked in Kilbrennan Lake. Under this alternative FWP would restock Kilbrennan Lake with eastern brook trout and redband trout.

FWP has a long history of stocking brook trout in Kilbrennan Lake, dating back as early as 1934, and continued until the mid 1950s. The brook trout population evidently became self-sustaining after early stocking events. FWP collected species composition information from Kilbrennan Lake prior to the introduction of black bullheads and yellow perch using gillnets, and catch rates of brook trout outnumbered rainbow trout in the 1950s at a ratio of approximately 3.5 to 1. Although the numbers of brook trout during this period may have been artificially elevated from stocking programs, it is likely that the presence of brook trout in the lake was limiting the number of rainbow trout present in the lake. This situation is likely to remain unchanged. If the black bullheads, yellow perch, and nonnative rainbow trout were removed from Kilbrennan Lake and the lake restocked with both redband trout and brook trout, it is likely that the two species would compete for food and space in Kilbrennan Lake, Feeder Creek, and Kilbrennan Creek.

Redband trout would likely occur at lower numbers within the lake even if angling harvest on redbands within the lake were low or nonexistent. Due to these considerations, this alternative has a low probability of meeting the objectives of this project.

Alternative 4 – Mechanical Removal

This alternative would involve using gillnets and/or trap nets to remove black bullheads, yellow perch, brook trout, and nonnative rainbow trout, then stocking redband trout to improve angling quality.

Gillnetting has been used successfully to remove unwanted fish from lakes. Bighorn Lake, a 5.2-acre lake located in Banff National Park in Alberta, Canada, was gillnetted from 1997 to 2000 to remove an unwanted population of brook trout (Parker et al. 2001). Over 10,000 net nights (1 net night = 1 net set overnight for at least 12 hours) were conducted over a 4-year period in Bighorn Lake to remove the population, which totaled 261 fish. The researchers concluded that the removal of nonnative trout using gillnets was impractical for larger lakes (> 5 acres). In clear lakes, trout have the ability to become acclimated to the presence of gillnets and to avoid them. These researchers reported observing brook trout avoiding gillnets within about 2 hours of being set. It is not known how black bullhead, yellow perch, nonnative rainbow trout, and brook trout would respond to gillnetting intended for complete removal. However, it is unlikely that gillnets would be effective at completely removing black bullheads from Kilbrennan Lake due to the species affinity for remaining near the bottom and in shallow habitats.

Knapp and Matthews (1998) reported that Maul Lake, a 3.9-acre lake in the Inyo National Forest in California, was gillnetted from 1992 to 1994 to remove a population of brook trout. The population, which totaled 97 fish, was successfully removed with an effort of 108 net days. The researchers reported that following the removal of brook trout from Maul Lake, it was mistakenly restocked with rainbow trout. Efforts to remove them using gillnets were implemented immediately. From 1994 through 1997, 4,562 net days were required to remove the 477 rainbow trout from the lake. These researchers reported that gillnets could be used as a viable alternative to chemical treatment. They acknowledged that the small size and shallow depth of Maul Lake leant itself to a successful fish eradication using gillnets. Their criteria for successful fish removal using gillnets include lakes less than 3.9 surface acres, less than 19 feet deep, with little or no inflow or outflow to perpetuate reinvasion, and no natural reproduction. Although not tested, the maximum size of a lake that they felt could be depopulated using gillnets was 7.4 surface acres and 32 feet deep.

No information was found that described the probability of success with using gillnets or trap nets to completely remove the four nonnative species from a lake. In any event, it seems unlikely that the four nonnative fish species currently present in Kilbrennan Lake could be successfully removed using nets.

Brook trout and nonnative rainbow trout also exist in Feeder and Kilbrennan Creeks. The use of nets or traps in the creeks would not be an effective method of capturing fish in the creeks. In addition, there would be an incredible time commitment required to attempt this method of removal. Due to these considerations and expected incomplete results, this alternative has a low probability of meeting the objectives.

Alternative 5 – Stocking the lake with brook trout and/or redband trout

This alternative involves stocking the lakes with redband and/or brook trout in the presence of nonnative rainbow trout, black bullheads, and yellow perch. FWP expects this alternative would do little to increase the long-term numbers of trout species present in Kilbrennan Lake. While this alternative may increase numbers of trout over the short term, competition between species would likely limit the long-term success of stocking in the presence of the other nonnative species. This alternative would also require a long-term stocking commitment to maintain the trout population. Based on these considerations, this alternative has a low probability of meeting the objectives.

PART IV. EA CONCLUSION SECTION

1. **Based on the significance criteria evaluated in this EA, is an EIS required (YES/NO)? If an EIS is not required, explain why the EA is the appropriate level of analysis for this proposed action.**

   FWP concludes that an EIS is not required for the implementation of this project. FWP further concludes from the information presented in this document that the proposed activities will have either no impact or a positive impact on the physical and human environment.

2. **Describe the level of public involvement for this project, if any, and given the complexity and the seriousness of the environmental issues associated with the proposed action, is the level of public involvement appropriate under the circumstances?**

   The draft environmental assessment (EA) is being distributed to all individuals and groups listed in the cover letter. The EA will be placed on the FWP web site. A public meeting will be held on Thursday, August 17, at 6 p.m. at the U.S. Forest Service Three Rivers Ranger District, 1437 N. Hwy 2, Troy, Montana. Contact Jim Dunnigan at (406) 293-4161 or the U.S. Forest Service (406) 295-4693) for more information.

3. **Duration of comment period, if any:**

   There will be a 30-day public comment period. Comments will be accepted through Monday, August 28, 2006. Submit comments to: Montana Fish, Wildlife & Parks, Attention: Jim Dunnigan, 475 Fish Hatchery Road, Libby, MT 59923, or e-mail to jdunnigan@mt.gov.

4. **Name, title, address and phone number of the person(s) responsible for preparing the EA:** Jim Dunnigan, Fisheries Biologist, FWP, 475 Fish Hatchery Road, Libby, MT 59923, (406) 293-4161.

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